

**THE UNIVERSITY OF WISCONSIN-MILWAUKEE
College of Engineering and Applied Science**

FACULTY MEETING

Friday, November 18, 2016 1:30 P.M. EMS E180

AGENDA

I. ANNOUNCEMENTS

II. INFORMAL REPORTS – See Attachment 1

A. Opportunity for questions regarding Informal Reports

III. AUTOMATIC CONSENT BUSINESS

A. Course Modifications – See Attachment 2

C. Computer Engineering Curriculum Revisions – See Attachment 3

B. Minutes of the October 28, 2016 Meeting

IV. NEW BUSINESS

A. Notice of Intent for B.S. in Environmental Engineering – See Attachment 4

V. COMMITTEE OF THE WHOLE DISCUSSION

A. Vice Provost Mark Harris – Ranking Metrics

B. Expectations of Department Chairs – See Attachment 5

VI. GENERAL GOOD AND WELFARE

VII. ADJOURNMENT

John R. Reisel, Secretary
CEAS Faculty

JRR
Attachments

INFORMAL REPORTS

Office of Student Services – Todd Johnson

On the following pages there are three enrollment reports: Fall 2015 Headcount, Fall 2016 Headcount, and Fall 2015 vs. 2016 Credits.

For Fall 2016, CEAS was 1.8% up in headcount but 1.8% down in credits. Most of the drop in credits is due to the loss of senior level undergraduate international students. The Brazilian government ended a study abroad program that sent us 40 students last year. Also we had a cohort of 20 Chinese students from North China Electrical Power University (NCEPU) graduate this past year. NCEPU did not send a big cohort for Fall 2016.

Here are some CEAS enrollment highlights for Fall 2016:

Total Enrollment:	2,215
Undergraduate Degree:	1,766
Undergraduate Special:	9
Masters	221
Doctoral	205
Graduate Non Degree	14

Table 1: Enrollment Facts At A Glance College of Engineering and Applied Science

Fall 2015

	UWM Total						UGRD						GRAD			
	Freshman	Sophomore	Junior	Senior	Special	Total	Freshman	Sophomore	Junior	Senior	Special	Total	Master	Doctoral	Non Degree	Total
Total	2,175	233	304	343	807	41	1,728						232	201	14	447
Men	1,848	194	273	309	720	19	1,515						176	145	12	333
Women	327	39	31	34	87	22	213						56	56	2	114
Residents	1,584	200	258	275	679	2	1,414						116	44	10	170
Non Residents	564	30	41	65	113	39	288						115	157	4	276
Minnesota Recip	27	3	5	3	15		26						1			1
African Amer	47	5	7	10	21		43						1	2	1	4
Amer Indian	3		2		1		3									
Latino/a	40	7	2	7	22		38						2			2
SE Asian Amer	49	2	8	11	26	1	48						1			1
Multi Ethnic Targeted	118	25	26	24	33		108						8		2	10
Targeted Subtotal	257	39	45	52	103	1	240						12	2	3	17
Asian Amer	71	7	12	6	24	1	50						12	8	1	21
International	467	10	28	44	71	38	191						117	155	4	276
Other Race	1													1		1
Multi Ethnic Not Targeted	20	4	5	3	7		19						1			1
White	1,353	173	214	238	600	1	1,226						88	33	6	127
Unknown	6				2		2						2	2		4
Average Age	24.0	18.3	20.5	22.3	24.9	21.7	22.7						27.1	31.8	29.2	29.3
Age 25+ Men	579	2	20	49	249	1	321						110	140	8	258
Age 25+ Women	117		1	3	21	3	28						35	52	2	89
New	313	200	9				209						75	19	10	104
First Generation Student	515	67	101	101	246	0	515						0	0	0	0
Advanced Standing	142	3	37	48	21	33	142									
Continuing	1,686	28	251	289	774	7	1,349						154	179	4	337
Reentry	34	2	7	6	12	1	28						3	3		6
Evening Only	55		1	4	8		13						27	11	4	42
FTE	1,907	225	285	312	722	34	1,578						142	181	7	330
Average Credits	12.3	14.5	14.0	13.6	13.4	12.5	13.7						7.3	6.3	5.8	6.8
Full Time	1,746	229	283	305	687	38	1,542						126	75	3	204
Part Time	429	4	21	38	120	3	186						106	126	11	243

Table 1: Enrollment Facts At A Glance College of Engineering and Applied Science

Fall 2016

	UWM Total						UGRD						GRAD		
	Total	Freshman	Sophomore	Junior	Senior	Special	Total	Special	Senior	Junior	Sophomore	Freshman	Master	Doctoral	Non Degree
Total	2,215	228	362	343	833	9	1,775	9	343	833	9	221	205	14	440
Men	1,889	198	305	306	747	7	1,563	7	306	747	7	157	155	14	326
Women	326	30	57	37	86	2	212	2	37	86	2	64	50		114
Residents	1,624	189	299	286	696	1	1,471	1	286	696	1	95	47	11	153
Non Residents	568	34	59	54	127	8	282	8	54	127	8	125	158	3	286
Minnesota Recip	23	5	4	3	10		22		3	10		1			1
African Amer	54	5	9	7	27		48		7	27		2	3	1	6
Amer Indian	2			2			2								
Latino/a	47	7	7	9	21		44		9	21		2	1		3
SE Asian Amer	46	4	3	8	29	1	45	1	8	29	1		1		1
Multi Ethnic Targeted	127	22	29	30	40		121		30	40		5		1	6
Targeted Subtotal	276	38	48	56	117	1	260	1	56	117	1	9	5	2	16
Asian Amer	87	5	14	18	28		65		18	28		15	6	1	22
International	449	14	36	27	77	8	162	8	27	77	8	130	155	2	287
Other Race	1												1		1
Multi Ethnic Not Targeted	27	7	7	5	6		25		5	6		2			2
White	1,368	163	256	237	604		1,260		237	604		63	36	9	108
Unknown	7	1	1		1		3			1		2	2		4
Average Age	23.9	18.5	20.6	22.0	24.8	21.6	22.6	21.6	22.0	24.8	21.6	26.7	31.9	35.6	29.4
Age 25+ Men	600	5	23	42	277		347		42	277		95	145	13	253
Age 25+ Women	115		3	3	23	1	30	1	3	23	1	36	49		85
New	316	196	11				207					71	27	11	109
First Generation Student	537	61	118	111	247	0	537	0	111	247	0	0	0	0	0
Advanced Standing	143	6	61	36	32	8	143	8	36	32	8				
Continuing	1,720	22	286	301	786	1	1,396	1	301	786	1	148	173	3	324
Reentry	36	4	4	6	15		29		6	15		2	5		7
Evening Only	48		1	1	8		10		1	8		28	5	5	38
FTE	1,943	224	343	310	721	8	1,605	8	310	721	8	139	192	6	337
Average Credits	12.3	14.7	14.2	13.6	13.0	12.6	13.6	12.6	13.6	13.0	12.6	7.6	6.6	5.3	7.0
Full Time	1,765	223	339	301	694	8	1,565	8	301	694	8	123	74	3	200
Part Time	450	5	23	42	139	1	210	1	42	139	1	98	131	11	240

University of Wisconsin--Milwaukee

Comparison of Enrollments to Date

Student Limits Set:

Course Limits Set:

Fall 2016						
October 17, 2016						
	Prior Year To Date Credits	Current Year To Date Credits	Difference	% Difference	Prior Year Final Credits	Ratio: Prior Year To Date / Final Credits
SARUP	6,268	6,031	-237	-3.8%	6,268	100.0%
PSOA	23,727	23,238	-489	-2.1%	23,727	100.0%
LSB	36,047	35,965	-82	-0.2%	36,047	100.0%
SOE	18,504	17,279	-1,225	-6.6%	18,504	100.0%
CEAS	20,208	19,853	-355	-1.8%	20,208	100.0%
SFS	362	280	-82	-22.7%	362	100.0%
CHS	20,573	19,635	-938	-4.6%	20,573	100.0%
SOIS	6,416	6,459	43	0.7%	6,416	100.0%
L&S	161,026	154,072	-6,954	-4.3%	161,026	100.0%
NURS	11,997	12,728	731	6.1%	11,997	100.0%
SPH	1,098	1,008	-90	-8.2%	1,098	100.0%
SW	10,033	9,851	-182	-1.8%	10,033	100.0%
GLBL	753	537	-216	-28.7%	753	100.0%
Total	317,012	306,936	-10,076	-3.2%	317,012	100.0%

Career Services – Juli Pickering
No Report

Curriculum Committee – Prof. Church
No Report

Graduate Program Subcommittee – Prof. Lopez
No Report

Academic Planning Committee – Prof. Misra

- 1) APC endorsed the revised proposal for establishing of Institute of Physical Infrastructure & Transportation.
- 2) The committee approved the revised proposal from the CEE for “Intent to Plan for BSE degree program in Environmental Engineering”.
- 3) Assistant Dean Klajbor made a presentation on the status of the budget and potential reductions in expenditures.
- 4) Dean Peters presented brief reports on the centers, and the marketing efforts of CEAS. APC reviewed the status of enrollment, retention, graduation rate, research output of the CEAS for developing of the assessment process of programs.
- 5) The committee continues to explore ways to establish the program assessment metrics.

Biomedical and Health Informatics – Prof. McRoy
No Report

Graduate Faculty Committee – Prof. Hosseini

Workload Policy

UWM Research Policy Committee (RPC) that reports to GFC, met on November 8, 2016 and discussed faculty Workload Policy in the context of conducting appropriate level of research. The discussion will continue in future meetings.

Next GFC meeting is scheduled for November 14, 2016.

Faculty Senate – Prof. Reisel

The Faculty Senate meets on November 17, and a report on their actions that day will be provided in the minutes.

COURSE CHANGES

IND ENG 367 (467) INTRODUCTORY STATISTICS FOR PHYSICAL SCIENCES AND ENGINEERING STUDENTS, 3 cr., U
Concepts of probability and statistics; probability distributions of engineering applications; sampling distributions; hypothesis testing; parameter estimation; regression analysis.
Prereq: B- or better in Math 211(P) or B- or better in Math 213(P) or C or better in Math 221(P) or C or better in Math 231(P).

had been

IND ENG 467 INTRODUCTORY STATISTICS FOR PHYSICAL SCIENCES AND ENGINEERING STUDENTS, 3 cr., U/G
Concepts of probability and statistics; probability distributions of engineering applications; sampling distributions; hypothesis testing; parameter estimation; regression analysis. Not open for cr for Math majors or students with cr in MthStat 362 or 465. IndEng 467 & MthStat 467 are jointly offered & count as repeats of one another.
Prereq: jr st; Math 233(P).

Computer Engineering – Program Revision

Summary:

1) Change the status of EE 335 Electronics II from a required Major course to a Group A Technical Elective course.

Thus, delete it from list of required Major courses and add it to the Group A Technical Elective list of courses.

2) Change the Status of CS 469 Introduction to Computer Security from a Group A Technical Elective to a required Major course.

Thus, delete it from Group A Technical Elective list of courses and add it to the list of required Major courses.

Justification / Rationale:

Computer Engr program follows our National/International Curriculum guidelines called ACM/IEEE curriculum guidelines 2016 which at large it represents academic and industry recommendation for courses of the program.

The changes are consistent with new recommendation.

University of Wisconsin – Milwaukee
College of Engineering and Applied Science

New COMPUTER ENGINEERING CURRICULUM

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Computer Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

Engineering Core Courses (12-13 credits)		Credits	Prerequisite
CompSci 250	Introductory Computer Programming	3	Math 116 or 211
EAS 200	Professional Seminar	1	None
ElecEng 301	Electrical Circuits I	3	Physic 210(C)
Ind Eng 467	Intro. Statistics for Physical Science & Engineering Students	3	Jr St, Math 233
MechEng 101	Computational Tools for Engineers	2	Math 221(C) or 231(C)
or			
CompSci 240	Introduction to Engineering Programming	3	Math Placement or Math 116

^Computer Engineering Major (54 credits)			
CompSci 251	Intermediate Computer Programming	3	CompSci 250*, Math Placement or Math 116 or 211
CompSci 317	Discrete Information Structures	3	CompSci 250*, Math 221*, 226* or 231*
CompSci 337	Systems Programming	3	CompSci 251*
CompSci 351	Data Structures & Algorithms	3	CompSci 251*, Math Placement or Math 116 or 211
CompSci 361	Introduction to Software Engineering	3	CompSci 351*, GER English
CompSci 395	Social, Professional & Ethical Issues	3	Soph St
CompSci 458	Computer Architecture	3	Jr St, CompSci 315 or ElecEng 367, 354
CompSci 469	Introduction to Computer Security	3	Jr St, CompSci 251*, 317*
CompSci 520	Computer Networks	3	Jr St, CompSci 315 or 458 or ElecEng 367
CompSci 535	Algorithm Design & Analysis	3	Jr St, CompSci 317*, 351*
CompSci 537	Introduction to Operating Systems	3	Jr St, CompSci 337, CompSci 458 or ElecEng 458
ElecEng 305	Electrical Circuits II	4	ElecEng 234, 301
ElecEng 310	Signals & Systems	3	ElecEng 305(C)
ElecEng 330	Electronics I	4	ElecEng 305(C)
ElecEng 354	Digital Logic	3	CompSci 240 or 250
ElecEng 367	Introduction to Microprocessors	4	CompSci 240 or 250, ElecEng 354*
ElecEng 457	Digital Logic Laboratory	3	Jr St, ElecEng 330, 354

^^Mathematics (14 - 16 credits)		(16 credits typical: Math 231,232,233, ElecEng 234)	
One of the following Calculus sequences must be completed:			
Math 231-232-233		12	Math placement score, or previous course with at least "C" grade
Or Math 221-222 (Honors)		10	
And ElecEng 234	Analytical Methods in Engineering	4	Math 232*

^^Chemistry (5 - 10 credits)		Chem 100* or Chemistry Placement; Math 105* or 108*	
One of the following sequences must be completed:			
Chem 105 (5 cr., Suggested) or Chem 102 -104 (10 cr.)			

Physics (8 credits)		Physics 209: Math 232(C) Physics 210: Math 233(C)	
Physics 209 – 210			

General Education Requirements			
<i>Distribution Requirements (15 credits)</i>			
Art		3	
Humanities		3	
Social Science		3	
Commun 105	Business & Professional Communication	3	
English 310	Writing, Speaking & Technoscience in the 21st Century	3	English Competency

Cultural Diversity - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.

Free Electives 0-2

Competency Requirements

^^English Composition (0-6 credits)

The English Composition requirement is satisfied by:

- Earning a satisfactory score on the English placement test **or**
- Earning a grade of C or higher in English 102 **or**
- Transferring with a grade of C or better in a course (3 credits or more) equivalent to English 102 or higher level expository writing course

Foreign Language (0-8 credits) (for new freshman starting fall 1999)

The foreign language requirement can be completed with one of these options:

- Two years of a single foreign language in high school
- Two semesters of a single foreign language in college
- Demonstrate ability by examination

***C or better in prerequisite** (C) Concurrent Enrollment in Designated Course

^Advancement to Major Requirements

1. Complete a minimum of 24 required credits (Excludes: general education, prerequisite and orientation courses). 2. Complete Math 232 (or 222) with a "C" or better grade. 3. Complete EAS 200 Professional Seminar. 4. Complete the English composition requirement. 5. Obtain a minimum cumulative grade point in all courses in item 1 of a 2.33. Pre-Engineering students may apply for major status with their academic advisor at any time they believe they meet the requirements. Advancement to major is a graduation requirement. Programs may impose major status as a prerequisite for courses numbered 300 or above.

^^Placement Examinations: Students without previous college level credits in Math, Chemistry or English may be required to take placement exams. The results of these tests determine the appropriate course in which to register. Background prerequisite courses may be required in addition to the courses listed above.

Technical Electives – Computer Engineering Major

The Compute Engineering program requires a total of 16 credits of technical electives, chosen as follows.

Group A Technical Elective: Select 9 to 12 credits from the following list

All Electrical Engineering and Computer Science courses numbered 300-699 that are not explicitly listed as Engineering Core, Computer Engineering Major, Group B Technical Elective, or Group C Technical Electives

		<u>Credits</u>	<u>Prerequisites</u>
CompSci 315	Intro to Comp Organization & Assembly Language Programming	3	CompSci 250, Math 116 or 211
CompSci 417	Introduction to the Theory of Computation	3	Jr St, CompSci 317*, Math 221 or 232
CompSci 422	Introduction to Artificial Intelligence	3	Jr St, CompSci 317*, 351*
CompSci 423	Introduction to Natural Language Processing	3	Jr St, CompSci 351*
CompSci 425	Introduction to Data Mining	3	Jr St, CompSci 251, Math 221 or 232
CompSci 431	Programming Languages Concepts	3	Jr St, CompSci 351*
CompSci 438	Software Engineering Lab	1-3	Jr St, CompSci 251*
CompSci 444	Intro to Text Retrieval & Its Applications in Biomedicine	3	Jr St, CompSci 351 or HCA 442
CompSci 459	Fundamentals of Computer Graphics	3	Jr St, CompSci 251, Math 232
CompSci 469	Introduction to Computer Security	3	Jr St, CompSci 251*, 317*
CompSci 511	Symbolic Logic	3	Jr St, Phil 212 or 6cr 300 math
CompSci 530	Computer Networks Laboratory	3	Jr St, CompSci 520
CompSci 536	Software Engineering	3	Jr St, CompSci 251*
CompSci 552	Advanced Object Oriented Programming	3	Jr St, CompSci 351*, 361*
CompSci 557	Introduction to Database Systems	3	Jr St, CompSci 251, 315
CompSci 654	Introduction to Compilers	4	Jr St, CompSci 431, 655(C)
CompSci 655	Compiler Implementation Laboratory	3	Jr St, CompSci 431, 654(C) or 754(C)
CompSci 657	Topics in Computer Science	1-4	Variable
CompSci 699	Independent Study	1-3	Variable
ElecEng 335	Electronics II	4	ElecEng 310(C), 330
ElecEng 361	Electromagnetic Fields	3	ElecEng 234, Math 233*, Physics 210
ElecEng 362	Electromechanical Energy Conversion	3	ElecEng 305, 361
ElecEng 410	Principles of Discrete Systems & Digital Signal Processing	3	Jr St, ElecEng 310
ElecEng 420	Random Signals & Systems	3	Jr St, ElecEng 310
ElecEng 421	Communication Systems	3	Jr St, ElecEng 335(C)
ElecEng 429	Wireless Communication Systems	3	Jr St, ElecEng 234
ElecEng 436	Introduction of Medical Instrumentation	3	Jr St, ElecEng 305
ElecEng 437	Introduction to Biomedical Imaging	3	Sr St, ElecEng 310
ElecEng 438	Bioanalytics & Biomedical Diagnostics	3	Sr St, ElecEng 310, 330
ElecEng 451	Introduction to VLSI Design	3	Jr St, ElecEng 330, 354
ElecEng 461	Microwave Engineering	3	Jr St, ElecEng 361
ElecEng 462	Antenna Theory	3	Jr St, ElecEng 361
ElecEng 464	Fundamentals of Photonics	3	Jr St, ElecEng 361
ElecEng 465	Broadband Optical networks	3	Jr St, ElecEng 305, 361
ElecEng 474	Introduction to Control Systems	4	Jr St, Civ Eng 202, CompSci 240, ElecEng 310
ElecEng 482	Introduction to Nanoelectronics	3	Jr St, ElecEng 330(C), 361(C)
ElecEng 490	Topics in Electrical Engineering	1-3	Jr St
ElecEng 537	Fundamentals of Neuroimaging Technology	3	Sr St, ElecEng 437
ElecEng 539	Introduction to Magnetic Resonance Imaging	3	Jr St, ElecEng 310, 361
ElecEng 541	Integrated Circuits & Systems	3	Jr St, ElecEng 330
ElecEng 561	Microwave Solid State Circuit Design	3	Sr St, ElecEng 330
ElecEng 562	Telecommunication Circuits	3	Sr St, ElecEng 330
ElecEng 563	Compound Semiconductor Devices & Circuits	3	Sr St, ElecEng 335
ElecEng 565	Optical Communication	3	Sr St, ElecEng 330, 361 or 465
ElecEng 572	Power Electronics	3	Sr St, ElecEng 335(C)
ElecEng 574	Intermediate Control Systems	3	Sr St, ElecEng 474 or MechEng 474
ElecEng 575	Analysis of Electric Machines & Motor Drives	3	Jr St, ElecEng 330, 362
ElecEng 588	Fundamentals of Nanotechnology	3	Jr St, ElecEng 361
ElecEng 699	Independent Study	1-3	Variable
Ind Eng 475	Simulation Methodology	3	CompSci 201(C), Ind Eng 467
Ind Eng 572	Reliability Engineering	3	Jr St, Ind Eng 467

Group B Technical Elective: Choose 4 credits from the following list

CompSci 595	Capstone Design Project	4	Sr St, CompSci 361, 458, 535, 537
ElecEng 595	Capstone Design Project	4	Sr St, ElecEng 335, 367

Group C Technical Electives: Select 0 to 3 credits from the following list

Bio Sci 150	Foundations of Biology I	4	Chem 100 or 102
Bio Sci 152	Foundations of Biology II	4	C- or better in Bio Sci 150
Bus Adm 292	Intro to Entrepreneurship & Small Business Foundation	3	Soph St
Bus Adm 447	Entrepreneurship	3	Jr St, Bus Adm 350
CompSci 481	Server-Side Internet Programming	3	CompSci 113(C), InfoSt 240(C), or Art 324(C)
CompSci 482	Rich Internet Applications	3	CompSci 361 or 481
CompSci 581	Web Languages & Standards	3	Jr St, CompSci 417, 431
CompSci 658	Topics in Applied Computing	3	Variable
EAS 001 Engineering Co-Op Work Period		3 ¹	Prior Cons Co-Op Dir
EAS 497 Study Abroad		1-3	Acceptance to Study Abroad Program
ElecEng 471	Electrical Power Systems	3	Jr St, ElecEng 362(C)
ElecEng 472	Intro to Wind Energy	3	Jr St
English 206	Technical Writing	3	GER English
Ind Eng 360	Engineering Economic Analysis	3	Jr St
MatlEng 201	Engineering Materials	4	Chem 102 or 105
MatlEng 481	Electronic Materials	3	Jr St, MatlEng 201
MechEng 301	Basic Engineering Thermodynamics	3	Math 233, Physics 209
MechEng 321	Basic Heat Transfer	4	Jr St, MechEng 301
MechEng 542	Introduction to Technology Entrepreneurship	3	Jr St, Admission to Major
MechEng 543	Introduction to Technology Management & Innovation	3	Jr St, Admission to Major

¹Students who earn 3 or more credits of Co-Op may use 3 of those credits as approved technical electives.

*C or better in prerequisite

(C) Concurrent Enrollment in Designated Course

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Current COMPUTER ENGINEERING CURRICULUM

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Computer Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

Engineering Core Courses (12-13 credits)		Credits	Prerequisite
CompSci 250	Introductory Computer Programming	3	Math 116 or 211
EAS 200	Professional Seminar	1	None
ElecEng 301	Electrical Circuits I	3	Physic 210(C)
Ind Eng 467	Intro. Statistics for Physical Science & Engineering Students	3	Jr St, Math 233
MechEng 101	Computational Tools for Engineers	2	Math 221(C) or 231(C)
or			
CompSci 240	Introduction to Engineering Programming	3	Math Placement or Math 116

^Computer Engineering Major (55 credits)			
CompSci 251	Intermediate Computer Programming	3	CompSci 250*, Math Placement or Math 116 or 211
CompSci 317	Discrete Information Structures	3	CompSci 250*, Math 221*, 226* or 231*
CompSci 337	Systems Programming	3	CompSci 251*
CompSci 351	Data Structures & Algorithms	3	CompSci 251*, Math Placement or Math 116 or 211
CompSci 361	Introduction to Software Engineering	3	CompSci 351*, GER English
CompSci 395	Social, Professional & Ethical Issues	3	Soph St
CompSci 458	Computer Architecture	3	Jr St, CompSci 315 or ElecEng 367, 354
CompSci 520	Computer Networks	3	Jr St, CompSci 315 or 458 or ElecEng 367
CompSci 535	Algorithm Design & Analysis	3	Jr St, CompSci 317*, 351*
CompSci 537	Introduction to Operating Systems	3	Jr St, CompSci 337, CompSci 458 or ElecEng 458
ElecEng 305	Electrical Circuits II	4	ElecEng 234, 301
ElecEng 310	Signals & Systems	3	ElecEng 305(C)
ElecEng 330	Electronics I	4	ElecEng 305(C)
ElecEng 335	Electronics II	4	ElecEng 310(C), 330
ElecEng 354	Digital Logic	3	CompSci 240 or 250
ElecEng 367	Introduction to Microprocessors	4	CompSci 240 or 250, ElecEng 354*
ElecEng 457	Digital Logic Laboratory	3	Jr St, ElecEng 330, 354

^^Mathematics (14 - 16 credits)		(16 credits typical: Math 231,232,233, ElecEng 234)	
One of the following Calculus sequences must be completed:			
Math 231-232-233		12	Math placement score, or previous course with at least "C" grade
Or Math 221-222 (Honors)		10	
And ElecEng 234	Analytical Methods in Engineering	4	Math 232*

^^Chemistry (5 - 10 credits)		Chem 100* or Chemistry Placement; Math 105* or 108*	
One of the following sequences must be completed:			
Chem 105 (5 cr., Suggested) or Chem 102 -104 (10 cr.)			

Physics (8 credits)		Physics 209: Math 232(C) Physics 210: Math 233(C)	
Physics 209 – 210			

General Education Requirements			
<i>Distribution Requirements (15 credits)</i>			
Art		3	
Humanities		3	
Social Science		3	
Commun 105	Business & Professional Communication	3	
English 310	Writing, Speaking & Technoscience in the 21st Century	3	English Competency
Cultural Diversity - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.			
Free Electives		0-1	
<i>Competency Requirements</i>			
^^English Composition (0-6 credits)			
The English Composition requirement is satisfied by:			
1. Earning a satisfactory score on the English placement test or			
2. Earning a grade of C or higher in English 102 or			
3. Transferring with a grade of C or better in a course (3 credits or more) equivalent to English 102 or higher level expository writing course			
Foreign Language (0-8 credits) (for new freshman starting fall 1999)			
The foreign language requirement can be completed with one of these options:			
1. Two years of a single foreign language in high school			
2. Two semesters of a single foreign language in college			
3. Demonstrate ability by examination			

***C or better in prerequisite** (C) **Concurrent Enrollment in Designated Course**

^Advancement to Major Requirements
 1. Complete a minimum of 24 required credits (Excludes: general education, prerequisite and orientation courses). 2. Complete Math 232 (or 222) with a "C" or better grade. 3. Complete EAS 200 Professional Seminar. 4. Complete the English composition requirement. 5. Obtain a minimum cumulative grade point in all courses in item 1 of a 2.33. Pre-Engineering students may apply for major status with their academic advisor at any time they believe they meet the requirements. Advancement to major is a graduation requirement. Programs may impose major status as a prerequisite for courses numbered 300 or above.

^^Placement Examinations: Students without previous college level credits in Math, Chemistry or English may be required to take placement exams. The results of these tests determine the appropriate course in which to register. Background prerequisite courses may be required in addition to the courses listed above.

Technical Electives – Computer Engineering Major

The Compute Engineering program requires a total of 16 credits of technical electives, chosen as follows.

Group A Technical Elective: Select 9 to 12 credits from the following list

All Electrical Engineering and Computer Science courses numbered 300-699 that are not explicitly listed as Engineering Core, Computer Engineering Major, Group B Technical Elective, or Group C Technical Electives

		<u>Credits</u>	<u>Prerequisites</u>
CompSci 315	Intro to Comp Organization & Assembly Language Programming	3	CompSci 250, Math 116 or 211
CompSci 417	Introduction to the Theory of Computation	3	Jr St, CompSci 317*, Math 221 or 232
CompSci 422	Introduction to Artificial Intelligence	3	Jr St, CompSci 317*, 351*
CompSci 423	Introduction to Natural Language Processing	3	Jr St, CompSci 351*
CompSci 425	Introduction to Data Mining	3	Jr St, CompSci 251, Math 221 or 232
CompSci 431	Programming Languages Concepts	3	Jr St, CompSci 351*
CompSci 438	Software Engineering Lab	1-3	Jr St, CompSci 251*
CompSci 444	Intro to Text Retrieval & Its Applications in Biomedicine	3	Jr St, CompSci 351 or HCA 442
CompSci 459	Fundamentals of Computer Graphics	3	Jr St, CompSci 251, Math 232
CompSci 469	Introduction to Computer Security	3	Jr St, CompSci 251*, 317*
CompSci 511	Symbolic Logic	3	Jr St, Phil 212 or 6cr 300 math
CompSci 530	Computer Networks Laboratory	3	Jr St, CompSci 520
CompSci 536	Software Engineering	3	Jr St, CompSci 251*
CompSci 552	Advanced Object Oriented Programming	3	Jr St, CompSci 351*, 361*
CompSci 557	Introduction to Database Systems	3	Jr St, CompSci 251, 315
CompSci 654	Introduction to Compilers	4	Jr St, CompSci 431, 655(C)
CompSci 655	Compiler Implementation Laboratory	3	Jr St, CompSci 431, 654(C) or 754(C)
CompSci 657	Topics in Computer Science	1-4	Variable
CompSci 699	Independent Study	1-3	Variable
ElecEng 361	Electromagnetic Fields	3	ElecEng 234, Math 233*, Physics 210
ElecEng 362	Electromechanical Energy Conversion	3	ElecEng 305, 361
ElecEng 410	Principles of Discrete Systems & Digital Signal Processing	3	Jr St, ElecEng 310
ElecEng 420	Random Signals & Systems	3	Jr St, ElecEng 310
ElecEng 421	Communication Systems	3	Jr St, ElecEng 335(C)
ElecEng 429	Wireless Communication Systems	3	Jr St, ElecEng 234
ElecEng 436	Introduction of Medical Instrumentation	3	Jr St, ElecEng 305
ElecEng 437	Introduction to Biomedical Imaging	3	Sr St, ElecEng 310
ElecEng 438	Bioanalytics & Biomedical Diagnostics	3	Sr St, ElecEng 310, 330
ElecEng 451	Introduction to VLSI Design	3	Jr St, ElecEng 330, 354
ElecEng 461	Microwave Engineering	3	Jr St, ElecEng 361
ElecEng 462	Antenna Theory	3	Jr St, ElecEng 361
ElecEng 464	Fundamentals of Photonics	3	Jr St, ElecEng 361
ElecEng 465	Broadband Optical networks	3	Jr St, ElecEng 305, 361
ElecEng 474	Introduction to Control Systems	4	Jr St, Civ Eng 202, CompSci 240, ElecEng 310
ElecEng 482	Introduction to Nanoelectronics	3	Jr St, ElecEng 330(C), 361(C)
ElecEng 490	Topics in Electrical Engineering	1-3	Jr St
ElecEng 537	Fundamentals of Neuroimaging Technology	3	Sr St, ElecEng 437
ElecEng 539	Introduction to Magnetic Resonance Imaging	3	Jr St, ElecEng 310, 361
ElecEng 541	Integrated Circuits & Systems	3	Jr St, ElecEng 330
ElecEng 561	Microwave Solid State Circuit Design	3	Sr St, ElecEng 330
ElecEng 562	Telecommunication Circuits	3	Sr St, ElecEng 330
ElecEng 563	Compound Semiconductor Devices & Circuits	3	Sr St, ElecEng 335
ElecEng 565	Optical Communication	3	Sr St, ElecEng 330, 361 or 465
ElecEng 572	Power Electronics	3	Sr St, ElecEng 335(C)
ElecEng 574	Intermediate Control Systems	3	Sr St, ElecEng 474 or MechEng 474
ElecEng 575	Analysis of Electric Machines & Motor Drives	3	Jr St, ElecEng 330, 362
ElecEng 588	Fundamentals of Nanotechnology	3	Jr St, ElecEng 361
ElecEng 699	Independent Study	1-3	Variable
Ind Eng 475	Simulation Methodology	3	CompSci 201(C), Ind Eng 467
Ind Eng 572	Reliability Engineering	3	Jr St, Ind Eng 467

Group B Technical Elective: Choose 4 credits from the following list

CompSci 595	Capstone Design Project	4	Sr St, CompSci 361, 458, 535, 537
ElecEng 595	Capstone Design Project	4	Sr St, ElecEng 335, 367

Group C Technical Electives: Select 0 to 3 credits from the following list

Bio Sci 150	Foundations of Biology I	4	Chem 100 or 102
Bio Sci 152	Foundations of Biology II	4	C- or better in Bio Sci 150
Bus Adm 292	Intro to Entrepreneurship & Small Business Foundation	3	Soph St
Bus Adm 447	Entrepreneurship	3	Jr St, Bus Adm 350
CompSci 481	Server-Side Internet Programming	3	CompSci 113(C), InfoSt 240(C), or Art 324(C)
CompSci 482	Rich Internet Applications	3	CompSci 361 or 481
CompSci 581	Web Languages & Standards	3	Jr St, CompSci 417, 431
CompSci 658	Topics in Applied Computing	3	Variable
EAS 001 Engineering Co-Op Work Period		3 ¹	Prior Cons Co-Op Dir
EAS 497 Study Abroad		1-3	Acceptance to Study Abroad Program
ElecEng 471	Electrical Power Systems	3	Jr St, ElecEng 362(C)
ElecEng 472	Intro to Wind Energy	3	Jr St
English 206	Technical Writing	3	GER English
Ind Eng 360	Engineering Economic Analysis	3	Jr St
MatlEng 201	Engineering Materials	4	Chem 102 or 105
MatlEng 481	Electronic Materials	3	Jr St, MatlEng 201
MechEng 301	Basic Engineering Thermodynamics	3	Math 233, Physics 209
MechEng 321	Basic Heat Transfer	4	Jr St, MechEng 301
MechEng 542	Introduction to Technology Entrepreneurship	3	Jr St, Admission to Major
MechEng 543	Introduction to Technology Management & Innovation	3	Jr St, Admission to Major

¹Students who earn 3 or more credits of Co-Op may use 3 of those credits as approved technical electives.

*C or better in prerequisite

(C) Concurrent Enrollment in Designated Course

Pre-Authorization: Intent to Plan a Bachelor of Science in Environmental Engineering Degree

- A. Name of proposed degree: Bachelor of Science in Environmental Engineering

Institutional setting: University of Wisconsin-Milwaukee, College of Engineering and Applied Science, Department of Civil and Environmental Engineering

Mode of delivery: In-person (on campus)

Institutional contact information: Dev Venugopalan, Associate Vice Chancellor for Academic Affairs

The Environmental Engineering program will seek accreditation by the Engineering Accreditation Commission of ABET and the Higher Learning Commission.

- B. How the program fits with institutional mission, strategic plan, and existing program array

The program clearly matches the CEAS mission “to educate students to become creative problem solvers, conduct leading-edge research with global impacts, and act as a catalyst for improved economic development and quality of life in Wisconsin.”

The program undoubtedly fits the CEAS Strategic Goals: “Create a dynamic environment and infrastructure to enhance innovative research”, “Anticipate and respond to market demands in order to produce graduates who are prepared to address and adapt to the changing needs of the marketplace and society”, and “Build partnerships with stakeholders and enhance awareness of CEAS strengths and accomplishments.”

The 2014 CEAS Academic Program Planning Report summarized the existing program in Civil Engineering, with four areas of concentration: geotechnical, structural, transportation, and water resources and environmental engineering. That report briefly described Environmental Engineering as new program under consideration. This degree option fits well with our research focus, holds promise for helping us address our diversity goals, and provides another pathway for enhanced collaboration within UWM, especially with the School of Freshwater Sciences and the College of Letters and Sciences, as well as with other universities. According to ASEE, female enrollment in Environmental Engineering programs grew from 38.3% in 2005 to 47.4% in 2014, and is the engineering discipline with the highest female enrollment.

- C. Program description

The Bachelor of Science in Environmental Engineering program will have a significantly different curriculum from the existing Bachelor of Science in Civil Engineering, with changes in the engineering core courses, environmental

engineering major courses, and technical electives. The core curriculum of the program will include courses in mathematics through differential equations, probability and statistics, calculus based physics, chemistry, earth science, biology and fluid mechanics. The curriculum will prepare graduates to formulate material and energy balances, analyze the fate and transport of substances in and between air, water and soil phases; conduct laboratory experiments, and analyze and interpret the resulting data in more than just one environmental engineering focus area, e.g., air, water land, environmental health; design environmental systems that include considerations of risk, uncertainty, sustainability, life-cycle principles, and environmental impacts; and apply advanced principles and practice relevant to the program objectives. The new program will use existing university resources and will require additional faculty members with adequate resources to be determined during the planning process. Preliminary analysis showed that the program will be revenue positive, justifying the need for additional resources.

The Bachelor of Science in Civil Engineering – Area of Water Resources and Environmental Engineering, will remain the same, i.e., students take 6 required credits in the area of concentration and 24 civil engineering elective credits, including 9 in the area of concentration.

D. Need for program

Occupational employment projections show a clear need for Environmental Engineers. The projection developed for Wisconsin by Labor Market Information (LMI) projected an 8.4% change in employment for Environmental Engineers from 2012 to 2022. The U.S Department of Labor Occupational Outlook Handbook projected a nationwide 12% (faster than average) percent change in employment for Environmental Engineers from 2014 to 2024.

The UW System offers programs in Environmental Engineering and Civil Engineering with option or emphasis in Environmental Engineering at UW-Madison and UW-Platteville. A program located in the UW System urban university that emphasizes topics relevant to southeastern Wisconsin and the Great Lakes watershed is clearly necessary.

UW-Madison offers an Environmental Engineering option within the Bachelor of Science in Civil Engineering program. Students who complete the Environmental Engineering option still receive an accredited BS degree in Civil Engineering and only the transcript will show that the student has complete the option. UW-Platteville is the only campus that offers an ABET accredited Bachelor of Science in Environmental Engineering in Wisconsin.

Marquette University offers curricula that lead to a Bachelor of Science degree in Civil Engineering or a Bachelor of Science degree in Construction Engineering. Students that pursue a Bachelor of Science degree in Civil Engineering may select from Civil Engineering or Environmental Engineering majors.

UNIVERSITY OF WISCONSIN-MILWAUKEE COLLEGE OF ENGINEERING & APPLIED SCIENCE

EXPECTATIONS OF CHAIRPERSONS

FOR EFFECTIVE LEADERSHIP OF DEPARTMENTS

The following supplements but does not replace the duties of the department chair as specified in section 4.07 of the Faculty Policies and Procedures (FP&P). **Following the FD 2381**, this document elaborates on FP&P 4.07 (9), which specifies that the Department Chair "acts as the executive of the department" and provides definition to the expectations for an "executive of the department". **Further, the department chair is reminded to be aware of the responsibilities of the executive committee as defined in section 4.05 of the UWM FP&P.**

A chairperson in the CEAS is expected to provide leadership for the department. These include the following over-arching leadership responsibilities:

1. Working with the faculty and staff to develop, implement, and achieve a vision that inspires and unites them to work together collegially to achieve the mission of the department, college and university.
2. Developing and executing a well-defined and articulated strategic plan that the faculty, staff, students, alumni and external advisory board supports. The plan must be in alignment with the initiatives and strategic plan of the college and the university.
3. Providing leadership to improve the level of excellence and prominence of the department.
4. ~~Promoting a well-managed office and support staff that supports administratively the instruction and research mission of the department.~~
5. Fostering and ensuring a departmental climate that is supportive and collegial, including taking steps to ensure that no one in the department is subjected to bullying or harassment.
6. Developing and implementing an advancement model to enhance alumni relations and engage in philanthropic activities that will benefit the department, college, and university and that aligns with those of the college and the university.
7. ~~Developing and implementing for all faculty, staff and students a safety plan for instructional and research activities that includes periodic training as well as annual safety inspections of laboratories.~~

The specific duties of the chair may differ from department to department based on personal style and departmental policy. In general, however, leadership encompasses the key responsibilities and accountabilities outlined below. Although the chair is responsible for ensuring that these expectations are met, many but not all of these activities can be delegated within the department. This "expectations" document should be used as a guideline by a chairperson and the departmental executive committees in establishing the delegation of duties and administrative structure of a department.

I. THE CHAIR IS EXPECTED TO BE THE CHAMPION OF FACULTY CAUSES

Example activities include, but not limited to:

- a. Assuming the primary responsibilities for **recruiting faculty and** retaining an excellent and diverse faculty;

- b. Ensuring appropriate mentoring and professional development programs exist for faculty, including assisting faculty to develop effective teaching, research and service efforts;
- c. Providing systems for continuous development and implementation of the strategic plan;
- d. Providing faculty with meaningful feedback on their performance annually, which could include explaining to faculty the basis for annual salary raises and promotions;
- e. Maintaining equity in faculty workloads, including teaching assignments;
- f. Establishing an active program for nominating faculty for awards both internally and externally;
- g. Bringing faculty concerns to the attention of the Dean and the APC.

II. THE CHAIR IS EXPECTED TO BE THE CHAMPION OF STUDENT INTERESTS

Example activities include, but not limited to:

- a. Striving for continuous improvement in the quality of instruction;
- b. Soliciting student feedback regarding teaching performance, course offerings and program quality;
- c. Responding to student concerns regarding department courses and program;
- d. Encouraging and supporting student participation in student organizations, national competitions, and leadership development opportunities;
- e. Ensuring effective student advising within the department;
- f. Nominating students for internal and external awards;
- g. Recruiting and retaining a diverse student population.

~~**III. THE CHAIR IS EXPECTED TO BE CHAMPION OF ADMINISTRATIVE STAFF**~~

~~Example activities include, but not limited to:~~

- ~~a. Organizing and maintaining effective staff support within the department;~~
- ~~b. Providing opportunities for training and professional development for staff that will benefit them, the department, and the college;~~
- ~~c. Providing, on an annual basis, direction and feedback regarding performance.~~

IV. THE CHAIR IS EXPECTED TO BE STEWARD OF DEPARTMENTAL RESOURCES

Example activities include, but not limited to:

- a. Managing department financial resources in a manner that provides opportunity while remaining within budget;
- b. Using UWM Foundation funds to benefit the department, and stewarding the donors who provided the funds;
- c. Striving for continuous improvement in quality in all departmental operations in a manner consistent with available resources;
- d. Providing oversight of faculty research expenditures;
- e. Managing facilities including assignment of space allocated to the department by the College as well as the periodic review and assessment of space utilization.

V. ACCOUNTABILITY AND PERFORMANCE

The department chair will provide a concise annual report to the Dean of the College that includes:

- a. The state of the department, including an assessment of the performance of the department in achieving its goals and deliverables as articulated in the department's strategic plan;
- b. A concise statement of the department's goal and deliverables to be achieved in the next academic year. This should include such items as a hiring plan for faculty, lecturers, and staff; instruction and research infrastructure needs, financial resources needed, etc.;
- c. Progress on and changes to the departmental strategic plan, and initiatives of the department, and how they align with the initiatives and strategic plan of the college and university;
- d. A self-assessment of the activities of the department chair during the current academic year and a concise statement of goals for the coming academic year.

The annual report must be received in the College no later than the last Monday in May of each year.

This document may be revised on an annual basis at the discretion of the APC or the Dean of the CEAS.